

# Time-Saving Comparison of Wound Measurement Between the Ruler Method and the Swift Skin and Wound App

Journal of Cutaneous Medicine and Surgery  
2019, Vol. 23(2) 226–228  
© The Author(s) 2018  
Article reuse guidelines:  
sagepub.com/journals-permissions  
DOI: 10.1177/1203475418800942  
journals.sagepub.com/home/jcms



Yunghan Au<sup>1\*</sup>, Benjamin Beland<sup>2\*</sup>, John A. E. Anderson<sup>3</sup>,  
Denis Sasseville<sup>4</sup> , and Sheila C. Wang<sup>4</sup>

## Keywords

wound, smartphone app, digital health, time efficiency

**Table 1.** Time ICC Values of the Ruler Method and the App.

Method	Average Time Taken Measurement and Documentation, s	ICC Value	Lower 95%	Upper 95%
Ruler time	48.17	0.84	0.72	0.93
App time	30.77	0.86	0.75	0.94

Abbreviation: ICC, intraclass correlation coefficient.

Chronic wounds are a major problem: an estimated 6.5 million people in the United States have chronic wounds that are highly susceptible to infection and difficult to manage.<sup>1</sup> Early identification of problematic wounds allows effective treatment, capable of changing disease course.<sup>2</sup> Accurate documentation and measurement of wounds are critical.

The gold standard for measuring wounds is a ruler: measuring the longest axis (length) and the greatest perpendicular width. This can overestimate wound area by up to 73.9%. Measuring wounds with digital photography has been shown to be more reliable.<sup>3</sup>

Swift Medical (Toronto, Ontario, Canada) has created a mobile application (Swift app) for wound management. The application calculates wound dimensions, including surface area, allowing highly accurate and reliable measurements, enabling wound progress to be tracked over time.<sup>4</sup> There are also administrative advantages in digitizing the wound documentation and measurement workflow (eg, time saving and accessing images).

The study objective was to investigate the impact of the Swift app on clinicians' time efficiency, specifically wound assessment and documentation time, compared to the ruler method.

Twenty medical students and dermatology residents (Faculty of Medicine, McGill University) participated voluntarily. The Swift app was used to photograph, measure, and document model wound images, using an iPhone (Apple, Cupertino, California), following training on the app. The time taken for each participant to measure the wound images (20 in total) using the Swift app and ruler method was recorded. For the ruler method, participants were instructed

to draw an image representing the wound and indicate where they measured length and width.

Mixed analysis of variance was used to compare measurement type (time taken to measure wound length and width, ruler vs app) across the 20 wounds repeated by each subject. Reliability was determined using intraclass correlation coefficients (ICCs) calculated in R.<sup>5</sup>

We compared time efficiencies when measuring and documenting wounds using the ruler method compared to the Swift app (Figure 1A [dashboard] and Figure 1B,C [drawing vs photo documentation comparison]). Measurement time by the ruler method was significantly slower than using the Swift app (Table 1; mean [SD], 48.17 [7.81] vs 30.77 [5.21] seconds;  $P < .001$ , ruler vs Swift app). For the ruler method, measurements took 16.85 seconds, while charting time took an additional 31.32 seconds. Hence, for combined measurement and documentation, the Swift app was 57% faster than the ruler method and paper charting.

<sup>1</sup>Department of Medical Affairs, Swift Medical, Toronto, ON, Canada

<sup>2</sup>Faculty of Medicine, McGill University, Montreal, QC, Canada

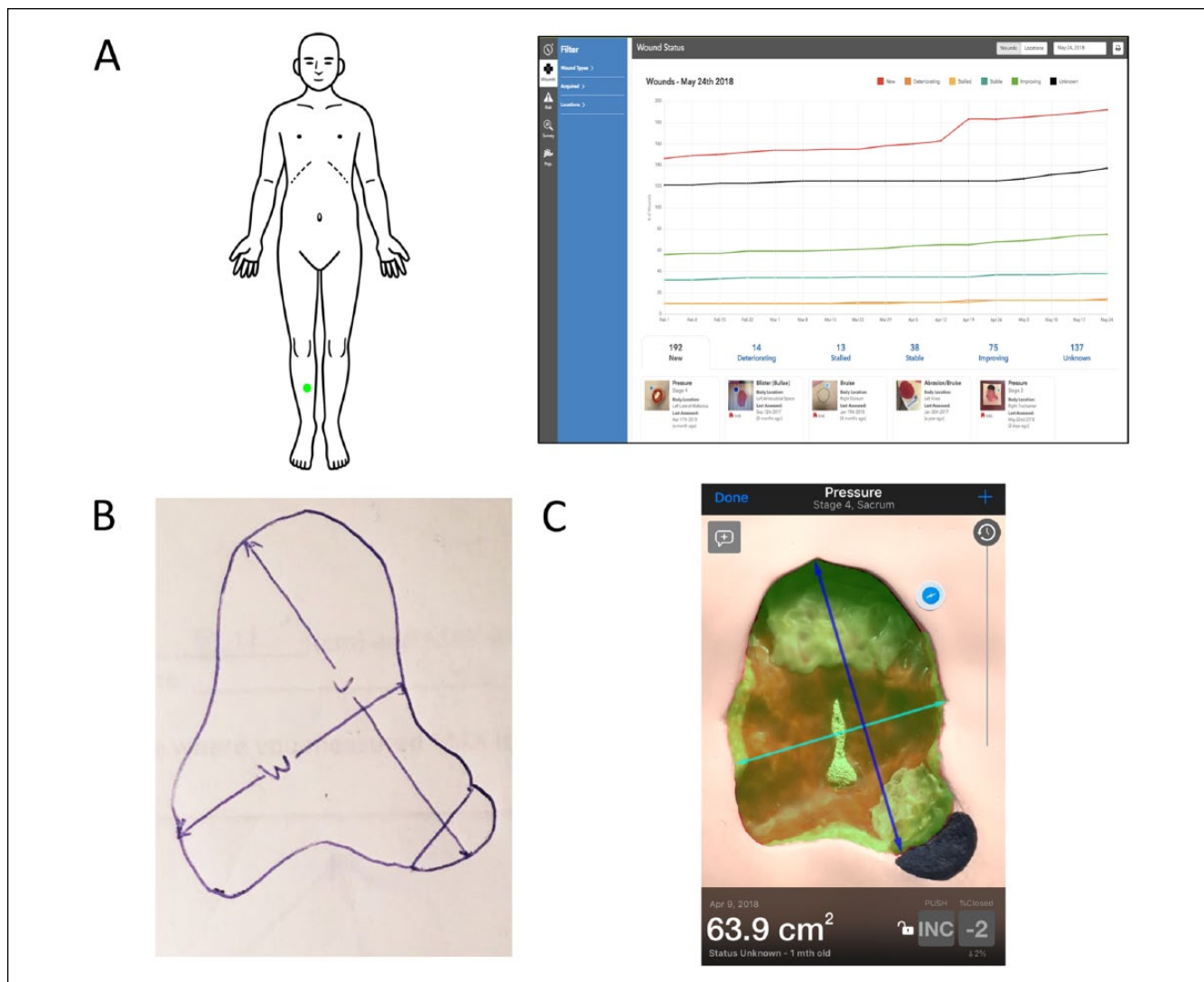
<sup>3</sup>Department of Psychology, York University, Toronto, ON, Canada

<sup>4</sup>Department of Medicine, Division of Dermatology, McGill University, Montreal, QC, Canada

\*These authors contributed equally to this work.

## Corresponding Author:

Sheila Wang, Department of Medicine, Division of Dermatology, McGill University, 1650 Cedar Avenue, Montreal, QC H3G 1A4, Canada.  
Email: sheila.wang@mail.mcgill.ca



**Figure 1.** Comparison of the Swift skin and wound app with the ruler method for wound measurement and documentation. (A) Example of body location screen within Swift app and dashboard display used to aggregate wound information. (B) Pen and paper drawing of a wound by one of the study participants and the Swift app display of the wound image with analysis. (C) Comparison of total measurement time by method (ruler vs app) across 20 wounds images.

The ruler method is widely used as it is perceived to be quick, despite large inaccuracies and low interrater reliability. We demonstrate here that wound assessment is significantly accelerated using the Swift app, representing a marked improvement over the standard and most commonly used method. We observed high user satisfaction when comparing completeness and objectivity of photo documentation compared to hand-drawn figures. Raters reported that photos provided substantially more insight than textual descriptions. Furthermore, hand-drawn images showed marked subjective variation, affecting recording accuracy (Figure 1B).

Wound photography is increasingly common in clinical practice and is recommended for managing wounds. Poor wound assessment and documentation cause inappropriate management decisions, negatively affecting patient care. Accurate wound tracking is an important criterion in

monitoring healing success and helps reduce medical errors, thus improving clinical outcomes.

Many services in wound care lack a dedicated time component so their action goes unpaid. Increasing the number of evaluations per day by reducing wound evaluation time would therefore improve productivity and financial gains. While wound assessment and documentation represent a single step in the clinical management workflow, we anticipate that by its very design and function, the Swift app will provide substantial improvements in other time-intensive clinical activities.

### Acknowledgments

Writing assistance for this manuscript was provided by Steen K. T. Ooi, who was provided with funding, while additional assistance

was provided by Kirsten Talbot. We also thank the medical students and dermatology residents who were participants of this study.


### Declaration of Conflicting Interests

The author(s) declared the following potential conflicts of interest with respect to the research, authorship, and/or publication of this article: S.C.W. is a cofounder and CMO of Swift Medical; Y.A. is an employee of Swift Medical. B.B. and J.E.E.A. declare no conflict of interest.

### Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

### ORCID iD

Denis Sasseville  <https://orcid.org/0000-0001-9104-2342>

### References

1. Sen CK, Gordillo GM, Roy S, et al. Human skin wounds: a major snowballing threat to public health and economy. *Wound Repair Regen* 2009. 2009;17(6):763-771.
2. Moffatt CJ, Doherty DC, Smithdale R, Franks PJ. Clinical predictors of leg ulcer healing. *Br J Dermatol*. 2010;162(1):51-58.
3. Langemo D, Anderson J, Hanson D, Hunter S, Thompson P. Measuring wound length, width, and area: which technique? *Adv Ski Wound Care*. 2008;21(1):42-45.
4. Wang SC, Evans R, Moreau L. Point-of-care wound visioning technology: reproducibility and accuracy of a wound measurement app. *PLoS One*. 2017;12(8):e0183139.
5. R Core Team. *A Language and Environment for Statistical Computing*. Vienna, Austria: R Foundation for Statistical Computing. 2011.

### Author Benefits

*JCMS* is a smart choice for publishing your work. There are no page charges and colour figures and images are always printed in colour at no cost to authors.